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Practitioner's Docket No.: 789_048 NP ' ***PATENT***

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the application of: Yukihisa TAKEUCHI, Kazuyoshi SHIBATA and Masahiko NAMERIKAWA

Ser. No.: 09/672,069 Group Art Unit: 2834

Filed: September 28, 2000 Examiner: Mark Osborne Budd

Confirmation No.: 7280

For: PIEZOELECTRIC/ELECTROSTRICTIVE DEVICE AND METHOD OF MANUFACTURING SAME

Mail Stop Appeal Brief-Patents
Commissioner for Patents
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Tara L. Preston

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TRANSMITTAL OF APPEAL BRIEF
(PATENT APPLICATION--37 C.F.R. § 1.192)

1. Transmitted herewith, in triplicate, is the APPEAL BRIEF in this application, with respect to the Notice of Appeal filed on January 18, 2006.

2. **STATUS OF APPLICANT**

This application is on behalf of [x] other than a small entity.
[ ] a small entity.

3. **FEE FOR FILING APPEAL BRIEF**

Pursuant to 37 C.F.R. § 1.17(c), the fee for filing the Appeal Brief is:

[ ] small entity $250.00
[x] other than a small entity $500.00

Appeal Brief Fee Due **$500.00**

4. EXTENSION OF TERM

The proceedings herein are for a patent application and the provisions of 37 C.F.R. § 1.136 apply.

(complete (a) or (b), as applicable)

(a) [ ] Applicant petitions for an extension of time under 37 C.F.R. § 1.136 (fees: 37 C.F.R. §1.17(a)(1)-(5)) for the total number of months checked below:

Extension (months)		Fee for other than small entity	Fee for small entity
	One month	$ 120.00	$ 60.00
	Two months	$ 450.00	$ 225.00
	Three months	$ 1,020.00	$ 510.00
	Four months	$ 1,590.00	$ 795.00
		Fee Due	$ 00.00

If an additional extension of time is required, please consider this a petition therefor.

(check and complete the next item, if applicable)

[ ] An extension for _____ months has already been secured, and the fee paid therefor of $ _____ is deducted from the total fee due for the total months of extension now requested.

Extension fee due with this request $_____

or

(b) [✘] Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

5. TOTAL FEE DUE

The total fee due is: Appeal brief fee $ 500.00
Extension fee (if any) $ 00.00

TOTAL FEE DUE $ 500.00

6. FEE PAYMENT

[✘] Attached is a check in the sum of $500.00.
[ ] Charge Account No. _____ the sum of $ _____. A duplicate of this transmittal is attached.

7. FEE DEFICIENCY

[✘] If any additional extension and/or fee is required, this is a request therefor and to charge Account No. 50-1446.

AND/OR

[✘] If any additional fee for claims is required, charge Account No. 50-1446.

Respectfully submitted,

March 17, 2006
Date

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BRIEF ON APPEAL

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I. Real Party in Interest – 37 CFR §41.37 (c)(1)(i)

The real party in interest is NGK Insulators, LTD.

II. Related Appeals and Interferences - 37 CFR §41.37 (c)(1)(ii)

There are no appeals or interferences regarding this application or any other application which is related to this application.

III. Status of the Claims - 37 CFR §41.37 (c)(1)(iii)

Claims 3, 4, 6-41 and 68-76 are pending.

Claims 3, 4, 6-13 and 68-76 stand finally rejected.

Claims 14-41 are allowed.

Appellants are appealing the rejection of claims 3, 4, 6-13 and 68-76 (as set forth in the Claims Appendix hereto pursuant to 37 CFR §41.37 (c)(1)(viii)).

IV. Status of Amendments - 37 CFR §41.37 (c)(1)(iv)

No amendments have been filed in this application after the presently-appealed final rejection (dated October 19, 2005).

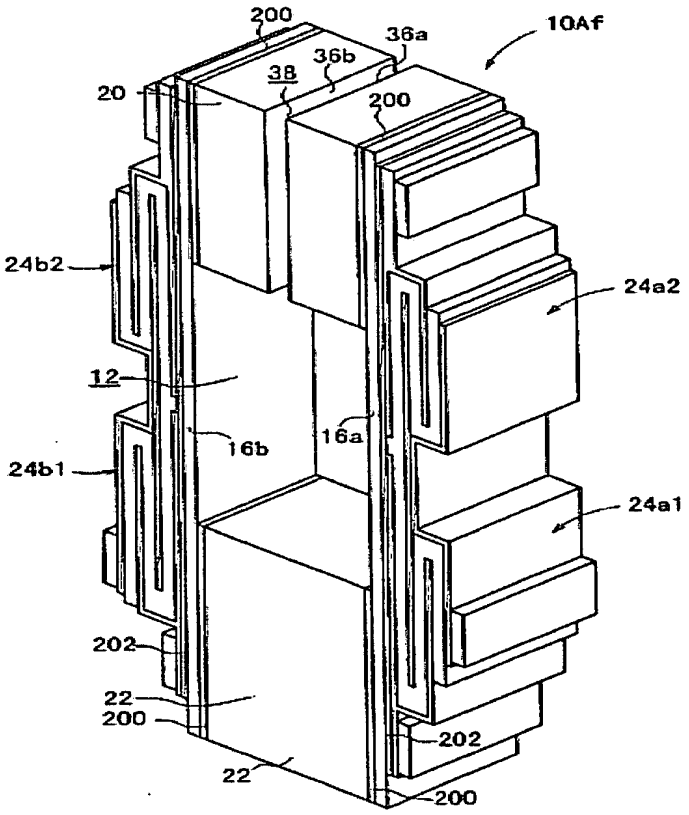
V. Summary of the Claimed Subject Matter - 37 CFR §41.37 (c)(1)(v)

A. Independent Claim 10

Claim 10 is directed to a piezoelectric/electrostrictive (P/E) device comprising a pair of mutually opposing thin plate sections 16a, 16b (see Fig. 8 reproduced on the next page) made of metal, a fixation section 22 for supporting the thin plate sections 16a, 16b, and a movable section 20 disposed at an opposite end of the thin plate sections 16a, 16b from the

fixation section 22. At least one of the movable section 20 and the fixation section 22 includes a slot 38 defined only by planar opposing surfaces 36a, 36b that are parallel to at least one of the thin plate sections 16a, 16b.

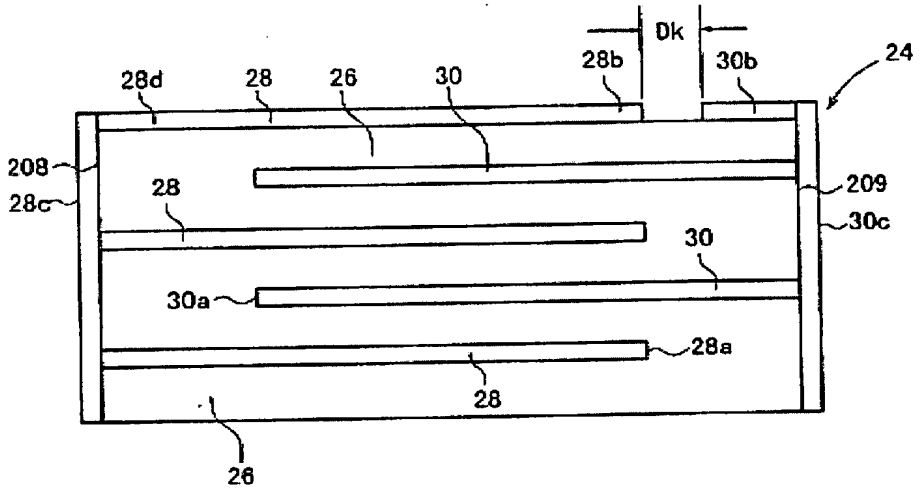
FIG. 8



The device further comprises an actuator section 24a1, 24a2, 24b1, 24b2 with a pair of stacked type P/E elements 24 (see Fig. 26 reproduced on the next page) fixed on at least one of the thin plate sections 16a, 16b by the aid of an adhesive. Each of the stacked type P/E elements comprises a plurality of P/E layers 26 (Fig. 26) and electrode films 28, 30 (Fig 26). The electrode films 28, 30 contact upper and lower surfaces of respective P/E layers 26 and alternately extend to opposite end surfaces 208, 209 (Fig. 26) thereof. The electrode films are

substantially rectangular (as shown generally in Fig. 8) having a constant and continuous width dimension and extending fully over a width dimension of the respective P/E layers.

FIG. 26



End surface electrodes 28c, 30c (Fig. 26) electrically connect an electrode film (end surface electrode 28c connects to electrode film 28 and end surface electrode 30c connects to electrode film 30) that contacts one of the P/E layers 26 and an electrode film 28, 30 that contacts another one of the P/E layers 26. The end surface electrodes 28c, 30c are formed on respective outer side surfaces 208, 209 of the P/E elements and are electrically connected to terminals 28b, 30b (Fig. 26), which are provided on a surface of an outermost layer of the P/E layers and are arranged substantially co-planar with respect to one another. The terminals 28b, 30b are separated from one another by a predetermined distance Dk (Fig. 26).

One of the stacked type P/E elements 24a2 or 24b2 is disposed partially on the thin plate section 16a or 16b and the movable section 20. The other of the stacked type P/E

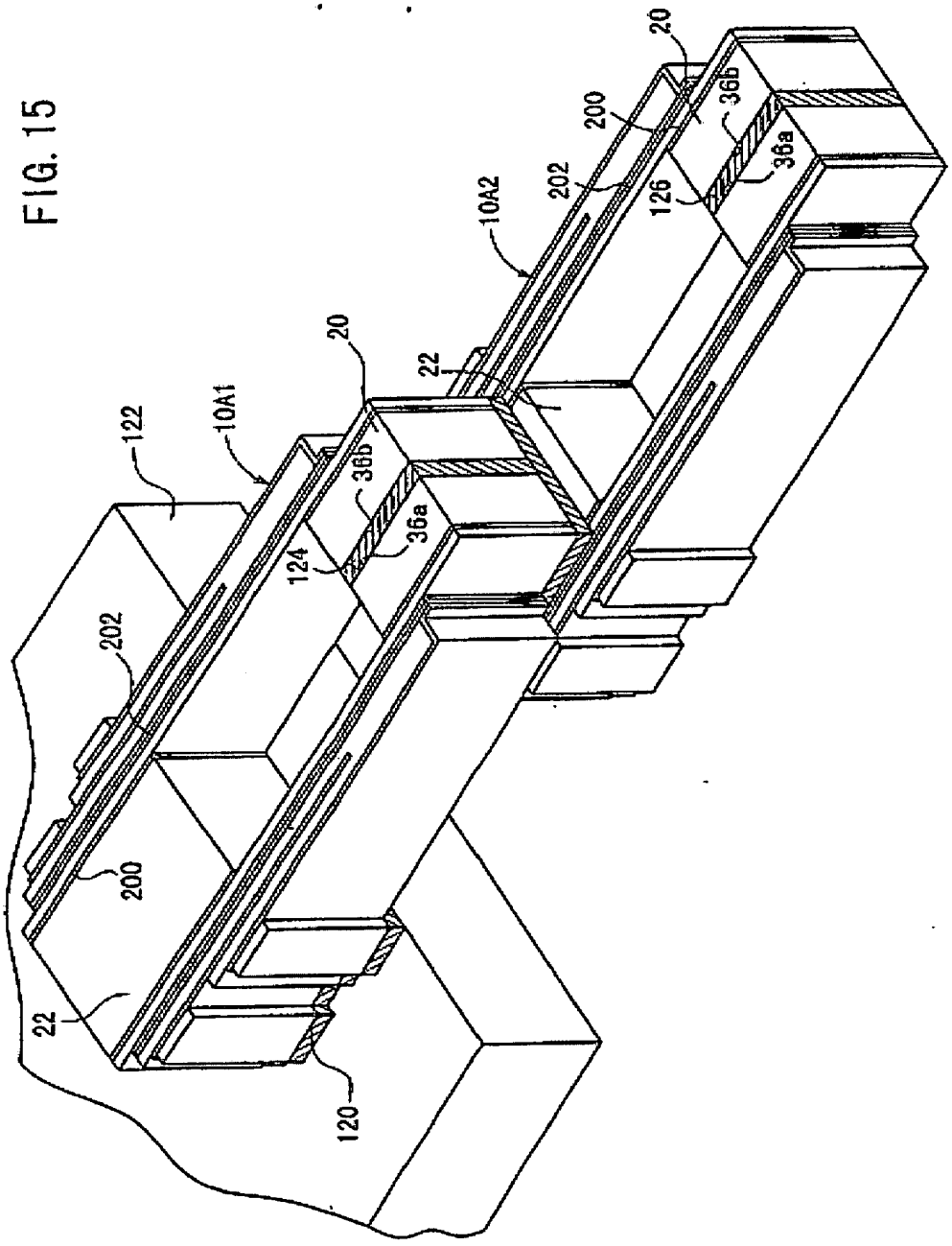
elements 24a1 or 24b1 is disposed partially on the thin plate section 16a or 16b and the fixation section 22.

The P/E device according to the present invention mutually converts electrical energy and mechanical energy using the P/E elements. For instance, displacement of the movable section 20 can be brought about by the inverse piezoelectric effect or the electrostrictive effect when a voltage is applied to the terminals of the P/E elements (specification, page 25, lines 13-22). In addition, displacement of the movable section 20 creates a voltage across the terminals of the P/E elements using the piezoelectric effect (specification, page 25, lines 13-25).

The placement of the P/E elements in the P/E device according to the present invention helps to greatly increase the displacement of the movable section 20 (specification, page 34, lines 15-27). This preferred placement includes placing the P/E elements on the thin plate sections such that they extend over the fixation section or the movable section (specification, page 34, lines 15-27).

The slot 38 is important for attachability of the P/E device to a mating part. First, the size and shape of the individual parts of the movable section 20A, 20B have a strong resistance to deformation (specification, page 43, lines 12-18). This resistance to deformation allows for relatively large planar surfaces 36a, 36b that can be used as attachment areas (specification, page 43, lines 19-27). As is shown in the embodiment disclosed in Fig. 15 (reproduced on the next page), the gap 38 defined by the planar surfaces 36a, 36b allows an adhesive 124 to be evenly distributed to reliably secure the mating part (specification, page 44, lines 1-6). Because the planar surfaces 36a, 36b are parallel to the thin plate sections, the thin plate sections will remain parallel when an even layer of adhesive 124 is applied between the surfaces 36a, 36b.

FIG. 15



The individual P/E elements used in the P/E device according to the present invention have a multilayered structure. By using more layers or stages in an individual P/E element, the amount of driving force created by the P/E element can be increased when a voltage is applied across its terminals (specification, page 73, lines 13-16). This additional force can be

used to increase the displacement of the movable section 22 or it can be used to realize a high resonance frequency (specification, page 73, lines 4-10). In the latter case, the overall rigidity of the P/E device can be increased, thus increasing the resonance frequency, when there is more force available to counteract the increased rigidity (specification, page 73, lines 7-10).

The multilayered P/E elements used in the P/E device according to the present invention beneficially have two terminals located on a surface of the outermost layer of the P/E layers rather than discrete terminals for each layer (specification, page 72, lines 24-27). The individual electrode films 28, 30 are connected to opposite end surface electrodes 28c, 30c respectively. These electrodes connect directly to the terminals 28b, 30b respectively.

To allow for independent operation of the electrodes the terminals are separated by a predetermined distance Dk. To further simplify installation or reduce space, the two terminals 28b, 30b beneficially can be mounted in a co-planar fashion in the outermost layer of the P/E layers (specification, page 73, lines 1-3). The co-planar nature of the terminals also facilitates the connection of lead wires, as the same soldering machine set up can be used to connect both terminals.

B. Independent Claim 74

Claim 74 is directed to a piezoelectric/electrostrictive (P/E) device comprising a pair of mutually opposing thin plate sections 16a, 16b (see Fig. 8) made of metal, a fixation section 22 for supporting the thin plate sections 16a, 16b, and a movable section 20 disposed at an opposite end of the thin plate sections 16a, 16b from the fixation section 22. At least one of the movable section 20 and the fixation section 22 includes a slot 38 defined only by

planar opposing surfaces 36a, 36b that are parallel to at least one of the thin plate sections 16a, 16b.

The device further comprises an actuator section 24a1, 24a2, 24b1, 24b2, with at least one stacked type P/E element 24 (see Fig. 26) fixed on at least one of the thin plate sections 16a, 16b by the aid of an adhesive. The at least one stacked type P/E element comprises a plurality of P/E layers 26 (Fig. 26) and electrode films 28, 30 (Fig 26). The electrode films 28, 30 contact upper and lower surfaces of respective P/E layers 26 and alternately extend to opposite end surfaces 208, 209 (Fig. 26) thereof.

End surface electrodes 28c, 30c (Fig. 26) electrically connect an electrode film (end surface electrode 28c connects to electrode film 28 and end surface electrode 30c connects to electrode film 30) that contacts one of the P/E layers 26 and an electrode film 28, 30 that contacts another one of the P/E layers 26. The end surface electrodes 28c, 30c are formed on respective outer side surfaces 208, 209 of the actuator section and are electrically connected to terminals 28b, 30b (Fig. 26), which are provided on a surface of an outermost layer of the P/E layers. The terminals 28b, 30b are separated from one another by a predetermined distance Dk (Fig. 26).

The at least one stacked type P/E element 24a1, 24a2, 24b1 or 24b21 is disposed partially on the thin plate section 16a or 16b and the fixation section 22, or partially on the thin plate section 16a or 16b and the movable section 20.

Independent claim 74 is similar to independent claim 10 with the following exceptions. First, claim 74 recites an actuator section with at least one stacked type P/E element, as opposed to claim 10, which recites an actuator section with a pair of P/E elements. Second, claim 74 does not require the electrode films to be substantially rectangular having a constant and continuous width dimension and extending fully over a

width dimension of the respective P/E layers, as recited in claim 10. Lastly, the terminals are not required to be co-planar with each other, as recited in claim 10.

C. Independent Claim 75

Claim 75 is directed to a piezoelectric/electrostrictive (P/E) device comprising a pair of mutually opposing thin plate sections 16a, 16b (Fig. 8) made of metal, a fixation section 22 (Fig. 8) for supporting the thin plate sections 16a, 16b, and a movable section 20 disposed at an opposite end of the thin plate sections 16a, 16b from the fixation section 22. At least one of the movable section 20 and the fixation section 22 includes a slot 38 defined only by planar opposing surfaces 36a, 36b. The device further comprises an actuator section 24a1, 24a2, 24b1, 24b2 with a pair of stacked type P/E elements 24 (Fig. 26) fixed on at least one of the thin plate sections 16a, 16b by the aid of an adhesive. Each of the stacked type P/E elements comprises a plurality of P/E layers 26 (Fig. 26) and electrode films 28, 30 (Fig 26). The electrode films 28, 30 contact upper and lower surfaces of respective P/E layers 26 and alternately extend to opposite end surfaces 208, 209 (Fig. 26) thereof. The electrode films are substantially rectangular (as shown generally in Fig. 8) having a constant and continuous width dimension and extending fully over a width dimension of the respective P/E layers.

End surface electrodes 28c, 30c (Fig. 26) electrically connect an electrode film (end surface electrode 28c connects to electrode film 28 and end surface electrode 30c connects to electrode film 30) that contacts one of the P/E layers 26 and an electrode film 28, 30 that contacts another one of the P/E layers 26. The end surface electrodes 28c, 30c are formed on respective outer side surfaces 208, 209 (Fig. 26) of the P/E elements and are electrically connected to terminals 28b, 30b (Fig. 26), which are provided on a surface of an outermost layer of the P/E layers and are arranged substantially co-planar with respect to one another.

The terminals 28b, 30b are separated from one another by a predetermined distance Dk (Fig. 26).

One of the stacked type P/E elements 24a2 or 24b2 is disposed partially on the thin plate section 16a or 16b and the movable section 20. The other of the stacked type P/E elements 24a1 or 24b1 is disposed partially on the thin plate section 16a or 16b and the fixation section 22.

Independent claim 75 is similar to independent claim 10 with the following exceptions. First, claim 75 does not require the planar opposing surfaces 36a, 36b to be parallel to at least one of the thin plate sections 16a, 16b, as recited in claim 10. Second, claim 75 does not require the electrode films to be substantially rectangular having a constant and continuous width dimension and extending fully over a width dimension of the respective P/E layers, as recited in claim 10.

D. Independent Claim 76

Claim 76 is directed to a piezoelectric/electrostrictive (P/E) device comprising a pair of mutually opposing thin plate sections 16a, 16b (Fig. 8) made of metal, a fixation section 22 for supporting the thin plate sections 16a, 16b, and a movable section 20 disposed at an opposite end of the thin plate sections 16a, 16b from the fixation section 22. At least one of the movable section 20 and the fixation section 22 includes a slot 38 defined only by planar opposing surfaces 36a, 36b.

The device further comprises an actuator section 24a1, 24a2, 24b1, 24b2 with at least one stacked type P/E element 24 (Fig. 26) fixed on at least one of the thin plate sections 16a, 16b by the aid of an adhesive. The at least one stacked type P/E element comprises a plurality of P/E layers 26 (Fig. 26) and electrode films 28, 30 (Fig 26). The electrode films

28, 30 contact upper and lower surfaces of respective P/E layers 26 and alternately extend to opposite end surfaces 208, 209 (Fig. 26) thereof.

End surface electrodes 28c, 30c (Fig. 26) electrically connect an electrode film (end surface electrode 28c connects to electrode film 28 and end surface electrode 30c connects to electrode film 30) that contacts one of the P/E layers 26 and an electrode film 28, 30 that contacts another one of the P/E layers 26. The end surface electrodes 28c, 30c are formed on respective outer side surfaces 208, 209 of the actuator section and are electrically connected to terminals 28b, 30b (Fig. 26), which are provided on a surface of an outermost layer of the P/E layers. The terminals 28b, 30b are separated from one another by a predetermined distance Dk (Fig. 26).

The at least one stacked type P/E element 24a1, 24a2, 24b1 or 24b2 is disposed partially on the thin plate section 16a or 16b and the fixation section 22, or partially on the thin plate section 16a or 16b and the movable section 20.

Independent claim 76 is similar to independent claim 10 with the following exceptions. First, claim 76 recites an actuator section with at least one stacked type P/E element, as opposed to claim 10, which recites an actuator section with a pair of P/E elements. Second, claim 76 does not require the planar opposing surfaces 36a, 36b to be parallel to at least one of the thin plate sections 16a, 16b, as recited in claim 10. Third, claim 76 does not require the electrode films to be substantially rectangular having a constant and continuous width dimension and extending fully over a width dimension of the respective P/E layers, as recited in claim 10. Lastly, the terminals are not required to be co-planar with each other, as recited in claim 10.

VI. Grounds of Rejection to be Reviewed on Appeal - 37 CFR §41.37 (c)(1)(vi)

There is only one ground of rejection to be reviewed on appeal - Claims 3, 4, 6-13 and 68-76 were rejected under §103(a) over Brunnée (U.S. Patent No. 4,612,440) in view of Arai (U.S. Patent No. 6,140,739) and further in view of Ogawa (U.S. Patent No. 4,805,057).

VII. Argument - 37 CFR §41.37 (c)(1)(vii)

For the reasons detailed below, the Examiner's positions are based only on hindsight, which is clearly not permitted under 35 USC §103(a).

A. Brunnée itself rebuts the Examiner's asserted motivation for moving the P/E elements to a location as shown in Arai to provide the claimed structure.

In the March 31, 2005 Office Action (reiterated by reference in the October 19, 2005 Final Office Action), the Examiner asserted that one skilled in the art would have been motivated to combine Arai with Brunnée, because Arai teaches that the relocation of P/E elements "to lie over the fixation and moveable elements (areas of greatest stress)" would "improve the efficiency of the device" (03-31-05 Office Action, page 2, lines 6-8 of the 3rd paragraph). Appellants respectfully submit, however, that the mere fact that a reference (in this case Arai) teaches that an element (in this case a specific P/E element location) is known does not provide motivation for one of ordinary skill in the art to combine the reference with a primary reference, such as Brunnée, which itself would not benefit from the use of such a component location. Further, the fact that the Examiner suggested a motivation for combining the references, rather than relying on a specific teaching in the references themselves to provide such motivation, does not negate the fact that the Examiner's asserted

motivation to combine the references is actually not a benefit when taken in the context of the reference in conjunction with the general understanding of those skilled in the art.

First, one skilled in the art would clearly see that the aperture of Brunnée has **NO** stress at the interfaces between the thin plate sections and the fixation section and between the thin plate sections and the movable section. The **ONLY** bending stress in the thin plates is located directly under the P/E elements, each of which is disposed entirely on the thin plate section. Therefore, the assertion that one skilled in the art would have been motivated to relocate the P/E elements in Brunnée to "lie over the fixation and movable elements (areas of greatest stress)" is not supported by the record, as these areas of Brunnée do not experience any significant stress.

Additionally, the section of Arai referred to by the Examiner, column 10, lines 9-12, further shows that his statements are misplaced and are **NOT** relevant when applied to Brunnée. Arai states that "great piezoelectric voltages are obtained at the regions 30 where the maximum stresses of the base material 4 concentrate" (Arai column 10, lines 9-12). One skilled in the art understands that voltages are created in a P/E element only when force is applied to the P/E element. On the other hand, energy in the form of voltage is required to induce movement in a P/E element, such as those movements desired in Brunnée. Brunnée recites that "when a voltage is applied to the piezo-electric element or elements 14, 15, the slit jaws are moved toward one another" (Brunnée column 4, lines 61-64).

Furthermore, one skilled in the art would have understood that the mechanical advantage that offers the highest voltage creation would likewise require a correspondingly high voltage to induce movement. Therefore, one skilled in the art would not have been motivated to relocate the P/E element of Brunnée from the current location, as any relocation would have **reduced the efficiency** of Brunnée.

B. Brunnée itself rebuts the Examiner's asserted motivation for using the stacked type P/E element from Ogawa to provide the claimed structure.

In the March 31, 2005 Office Action (reiterated by reference in the October 19, 2005 Final Office Action), the Examiner asserted that one skilled in the art would have been motivated to combine Ogawa with Brunnée, because the use of a stacked type P/E element would provide "increased displacement" (03-31-05 Office Action, page 2, line 9 of the 3rd paragraph). Appellants respectfully submit, however, that the mere fact that a reference (in this case Ogawa) teaches that an element (in this case a stacked type P/E element) is known does not provide motivation for one of ordinary skill in the art to combine the reference with a primary reference, such as Brunnée, which itself can in no way benefit from the use of such a component. Further, the fact that the Examiner suggested a motivation for combining the references, rather than relying on a specific teaching in the references themselves to provide such motivation, does not negate the fact that the Examiner's asserted motivation to combine the references is actually useless when taken in the context of the reference in conjunction with the general understanding of those skilled in the art.

There is no support in the record that the P/E element of Ogawa provides increased displacement when compared to the P/E element of Brunnée. Moreover, there is nothing in the record that supports the Examiner's position that additional displacement is needed in the device of Brunnée. As taught by Brunnée, the spring force of the thin plate sections holds the aperture in a predetermined resting position (Brunnée column 4, lines 58-61). The application of a voltage to the single layer P/E element of Brunnée only works to deflect the aperture inward to a maximum position where the aperture would be closed (Brunnée column 4, lines 61-64, and Fig 3). One skilled in the art would have known that that once the aperture is closed the aperture can no longer be moved further. Accordingly, one skilled in

the art would not have been motivated to add additional displacement to a device where no additional displacement is needed. Therefore, the Examiner's assertion that it would have been obvious to use the stacked type P/E element of Ogawa in Brunnée's adjustable aperture device because it would "increase displacement" is refuted by the references themselves.

C. Brunnée rebuts the Examiner's asserted motivation for using terminals located on a surface of an outermost layer of the P/E layers, as shown in Ogawa, to provide the claimed structure.

The Examiner asserted that placing both of the terminals on "a same side of the stack of elements" would have been obvious because of "ease of manufacture" (03-31-05 Office Action, page 2, lines 10-11 of 3rd paragraph). Appellants again respectfully submit, however, that the mere fact that a reference (in this case Ogawa) teaches that an element (in this case placing both P/E terminals on an outermost layer of a P/E element) is known does not provide motivation for one of ordinary skill in the art to combine the reference with a primary reference, such as Brunnée, which itself can in no way benefit from the use of such a feature. Further, the fact that the Examiner suggested a motivation for combining the references, rather than relying on a specific teaching in the references themselves to provide such motivation, does not negate the fact that the Examiner's asserted motivation to combine the references is actually useless when taken in the context of the reference in conjunction with the general understanding of those skilled in the art.

Appellants respectfully submit that Brunnée discloses using the metal thin plate section as the negative or common electrode (Brunnée Fig. 3). This arrangement allows for **one** common lead to be attached to **one** common terminal that would be conducted through the mounting base to **both** thin plate sections. A significant redesign would be necessary to run an electrode from the metallic thin plate section to the outer electrode and electrically

isolate the outer electrode from the common electrode being run from the thin plate section. Accordingly, the design of Brunnée would be made much more complex with the addition of more terminals and the addition of electrical isolations. All of this added complexity would not result in any advantage that is recognized by the applied references. The Examiner's assertion that placing both of the terminals on "a same side of the stack of elements" would have been obvious because of "ease of manufacture" is not supported by the record, and thus is based only on hindsight.

For the reasons explained above, the features of independent claim 10 would not have been obvious to one skilled in the art based on Brunnée, Arai and Ogawa taken in any combination. Claims 3, 4, 6-9, 11-13 and 68-73 all depend, directly or indirectly, from independent claim 10, and thus are allowable for the same reasons explained above with respect to independent claim 10.

Independent claims 74-76 are similar to claim 10 in that they recite all three of the features of claim 10 argued above. Accordingly, for the same reasons explained above with respect to claim 10, it is respectfully submitted that independent claims 74-76 likewise define patentable subject matter over the applied references.

* * * * * *

For at least the foregoing reasons, the Honorable Board of Patent Appeals and Interferences is respectfully requested to reverse the Final Rejection of claims 3, 4, 6-13 and 68-76, and instruct the Examiner to issue a Notice of Allowance for all pending claims.

Respectfully submitted,

March 17, 2006

Date

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Attachments: Claims Appendix (37 CFR §41.37(c)(1)(viii))

Claims Appendix

37 CFR §41.37 (c)(1)(viii)

Claims 1-2 (Cancelled)

3. (Previously Presented) The piezoelectric/electrostrictive device according to claim 8, wherein said actuator section comprises ten or less of said actuator films.

4. (Previously Presented) The piezoelectric/electrostrictive device according to claim 8, wherein each of said actuator films is formed by means of a thick film printing method.

5. (Cancelled)

6. (Previously Presented) The piezoelectric/electrostrictive device according to claim 8, wherein said adhesive has a thickness of not more than 15 mm.

7. (Previously Presented) The piezoelectric/electrostrictive device according to claim 8, further comprising an underlying layer formed on a surface of said stacked type piezoelectric/electrostrictive elements opposed to a respective one of said thin plate sections.

8. (Previously Presented) The piezoelectric/electrostrictive device according to claim 10, wherein said actuator section includes at least three actuator films comprising piezoelectric/electrostrictive layers and electrode films, wherein one or more holes are formed in at least a portion of said thin plate sections on which said stacked type piezoelectric/electrostrictive elements are formed, said one or more holes being formed entirely through said thin plate sections in the thickness direction.

9. (Previously Presented) The piezoelectric/electrostrictive device according to claim 8, wherein at least a portion of a surface of each of said thin plate sections, on which said stacked type piezoelectric/electrostrictive elements are formed, is a rough surface.

10. (Previously Presented) A piezoelectric/electrostrictive device comprising a pair of mutually opposing thin plate sections made of metal, a fixation section for supporting said thin plate sections, and a movable section disposed at an opposite end of said thin plate sections from said fixation section, wherein at least one of said movable section and said fixation section includes a slot defined only by planar opposing surfaces that are parallel to at least one of said thin plate sections, and including an actuator section with a pair of stacked type piezoelectric/electrostrictive elements fixed on at least one of said thin plate sections by the aid of an adhesive, each of said stacked type piezoelectric/electrostrictive elements comprising a plurality of piezoelectric/electrostrictive layers and electrode films, wherein said electrode films contact upper and lower surfaces of respective piezoelectric/electrostrictive layers and alternately extend to opposite end surfaces thereof, wherein said electrode films are substantially rectangular having a constant and continuous width dimension and extending fully over a width dimension of said respective piezoelectric/electrostrictive layers, and end surface electrodes electrically connect an electrode film that contacts one of said piezoelectric/electrostrictive layers and an electrode film that contacts another one of said piezoelectric/electrostrictive layers, said end surface electrodes being formed on respective outer side surfaces of said piezoelectric/electrostrictive elements and being electrically connected to terminals which are provided on a surface of an outermost layer of said piezoelectric/electrostrictive layers and arranged substantially co-planar with respect to one another, said terminals being separated from one another by a predetermined distance, wherein one of said stacked type piezoelectric/electrostrictive elements is disposed partially on said thin plate section and said movable section, and the other of said stacked type piezoelectric/electrostrictive elements is disposed partially on said thin plate section and said fixation section.

11. (Previously Presented) The piezoelectric/electrostrictive device according to claim 10, wherein said pair of stacked type piezoelectric/electrostrictive elements have a substantially rectangular parallelepiped-shaped configuration.

12. (Original) The piezoelectric/electrostrictive device according to claim 10, wherein said predetermined distance between said terminals is not less than 50 mm.

13. (Original) The piezoelectric/electrostrictive device according to claim 10, wherein at least one of said terminals and one of said end surface electrodes are electrically connected with each other with an electrode film having a film thickness which is thinner than those of said terminal and said end surface electrode.

Claims 14-41 (Allowed)

Claims 42-67 (Cancelled)

68. (Previously Presented) The piezoelectric/electrostrictive device according to claim 10, wherein said actuator section comprises ten or less of said piezoelectric/electrostrictive layers.

69. (Previously Presented) The piezoelectric/electrostrictive device according to claim 10, wherein each of said stacked type piezoelectric/electrostrictive elements is formed by means of a thick film printing method.

70. (Previously Presented) The piezoelectric/electrostrictive device according to claim 10, wherein said adhesive has a thickness of not more than 15mm.

71. (Previously Presented) The piezoelectric/electrostrictive device according to claim 10, further comprising an underlying layer formed on a surface of said stacked type piezoelectric/electrostrictive elements opposed to a respective one of said thin plate sections.

72. (Previously Presented) The piezoelectric/electrostrictive device according to claim 10, wherein at least a portion of a surface of each of said thin plate sections, on which said stacked type piezoelectric/electrostrictive elements are formed, is a rough surface.

73. (Previously Presented) The piezoelectric/electrostrictive device of claim 10, wherein said end surface electrodes each include a major plane extending substantially perpendicular to planes of said electrode films.

74. (Previously Presented) A piezoelectric/electrostrictive device comprising a pair of mutually opposing thin plate sections made of metal, a fixation section for supporting said thin plate sections, and a movable section disposed at an opposite end of said thin plate sections from said fixation section, wherein at least one of said movable section and said fixation section includes a slot defined only by planar opposing surfaces that are parallel to at least one of said thin plate sections, and including an actuator section with at least one stacked type piezoelectric/electrostrictive element fixed on at least one of said thin plate sections by the aid of an adhesive, said at least one stacked type piezoelectric/electrostrictive element comprising a plurality of piezoelectric/electrostrictive layers and electrode films, wherein said electrode films contact upper and lower surfaces of respective piezoelectric/electrostrictive layers and alternately extend to opposite end surfaces thereof, and end surface electrodes electrically connect an electrode film that contacts one of said piezoelectric/electrostrictive layers and an electrode film that contacts another one of said piezoelectric/electrostrictive layers, said end surface electrodes being formed on respective outer side surfaces of said actuator section and being electrically connected to terminals which are provided on a surface of an outermost layer of said piezoelectric/electrostrictive layers, said terminals being separated from one another by a predetermined distance, wherein said at least one stacked type piezoelectric/electrostrictive element is disposed partially on said thin plate section and said fixation section, or partially on said thin plate section and said movable section.

75. (Previously Presented) A piezoelectric/electrostrictive device comprising a pair of mutually opposing thin plate sections made of metal, a fixation section for supporting said thin plate sections, and a movable section disposed at an opposite end of said thin plate sections from said fixation section, wherein at least one of said movable section and said fixation section includes a slot defined only by planar opposing surfaces, and including an actuator section with a pair of stacked type piezoelectric/electrostrictive elements fixed on at least one of said thin plate sections by the aid of an adhesive, each of said stacked type piezoelectric/electrostrictive elements comprising a plurality of piezoelectric/electrostrictive layers and electrode films, wherein said electrode films contact upper and lower surfaces of respective piezoelectric/electrostrictive layers and alternately extend to opposite end surfaces thereof, wherein said electrode films are substantially rectangular having a constant and

continuous width dimension and extending fully over a width dimension of said respective piezoelectric/electrostrictive layers, and end surface electrodes electrically connect an electrode film that contacts one of said piezoelectric/electrostrictive layers and an electrode film that contacts another one of said piezoelectric/electrostrictive layers, said end surface electrodes being formed on respective outer side surfaces of said piezoelectric/electrostrictive elements and being electrically connected to terminals which are provided on a surface of an outermost layer of said piezoelectric/electrostrictive layers and arranged substantially co-planar with respect to one another, said terminals being separated from one another by a predetermined distance, wherein one of said stacked type piezoelectric/electrostrictive elements is disposed partially on said thin plate section and said movable section, and the other of said stacked type piezoelectric/electrostrictive elements is disposed partially on said thin plate section and said fixation section.

76. (Previously Presented) A piezoelectric/electrostrictive device comprising a pair of mutually opposing thin plate sections made of metal, a fixation section for supporting said thin plate sections, and a movable section disposed at an opposite end of said thin plate sections from said fixation section, wherein at least one of said movable section and said fixation section includes a slot defined only by planar opposing surfaces, and including an actuator section with at least one stacked type piezoelectric/electrostrictive element fixed on at least one of said thin plate sections by the aid of an adhesive, said at least one stacked type piezoelectric/electrostrictive element comprising a plurality of piezoelectric/electrostrictive layers and electrode films, wherein said electrode films contact upper and lower surfaces of respective piezoelectric/electrostrictive layers and alternately extend to opposite end surfaces thereof, and end surface electrodes electrically connect an electrode film that contacts one of said piezoelectric/electrostrictive layers and an electrode film that contacts another one of said piezoelectric/electrostrictive layers, said end surface electrodes being formed on respective outer side surfaces of said actuator section and being electrically connected to terminals which are provided on a surface of an outermost layer of said piezoelectric/electrostrictive layers, said terminals being separated from one another by a predetermined distance, wherein said at least one stacked type piezoelectric/electrostrictive element is disposed partially on said thin plate section and said fixation section, or partially on said thin plate section and said movable section.